

Amendments to the Claims

This listing of claims will replace the originally filed claims in the application.

Listing of Claims:

Claims 1 – 11 (cancelled).

Claim 12 (new): A method for treating at least one feed gas by adsorption, of the type in which a pressure swing adsorption treatment unit is used and in which said treatment unit is made to follow a nominal operating cycle defined according to nominal operating conditions and for the purpose of guaranteeing minimum feed gas treatment performance levels, wherein:

- a) at least one preprogrammed auxiliary operating cycle, different from the nominal cycle, is used;
- b) when the operating conditions differ from the nominal conditions to the point that the treatment unit no longer achieves its minimum performance levels, the treatment unit is made to follow the at least one auxiliary cycle;
- c) the nominal operating cycle is identified by a triplet X.Y.Z, where X denotes the number of active adsorbers of the treatment unit, Y denotes the number of adsorbers in simultaneous adsorption and Z denotes the number of pressure balancing steps carried out on said nominal cycle; and
- d) at least one of the number X' of active adsorbers, of the number Y' of adsorbers in simultaneous adsorption and of the number Z' of pressure balancing steps carried out on each of the at least one auxiliary cycles is different from the corresponding number of the nominal cycle.

Claim 13 (new): The method of claim 12, wherein the composition of the feed gas is an operating condition.

Claim 14 (new): The method of claim 12, wherein the pressure of the feed gas and the pressure of a waste gas output by the treatment unit are operating conditions.

Claim 15 (new): The method of claim 12, wherein the temperature of the feed gas is an operating condition.

Claim 16 (new): The method of claim 12, wherein the flow rate of the feed gas is an operating condition.

Claim 17 (new): The method of claim 12, wherein preprogrammed intermediate

steps are used for passing from one cycle to the other from among the nominal cycles and auxiliary cycle(s).

Claim 18 (new): The method of claim 12, wherein at least one of the pressure balancing steps is a partial balancing step so that at least one of the numbers Z and Z' is not an integer.

Claim 19 (new): The method of claim 12, wherein the nominal cycle and each of the at least one auxiliary cycles include the following steps:

- a) at least one adsorption step at a high pressure (HP) of the cycle;
- b) a purge step consisting of a countercurrent depressurization down to the low pressure (LP) of the cycle;
- c) an elution step at said low pressure; and
- d) a repressurization step up to said high pressure, the (duration of the adsorption phase)/(duration of the purge and elution steps) ratio being substantially between 0.5 and 2 for each of the cycles.

Claim 20 (new): The method of claim 12, wherein the treatment unit is a hydrogen production unit.

Claim 21 (new): A combined hydrogen/carbon monoxide production plant comprising:

- a) at least one reactor for the production of a syngas;
- b) at least one unit for the decarbonization of the syngas;
- c) at least one unit for the purification of the decarbonized gas;
- d) at least one cryogenic unit for the production of carbon monoxide, connected to one outlet of the purification unit; and
- e) at least one unit for treatment by pressure swing adsorption, connected to another outlet of the purification unit,

wherein said pressure swing adsorption treatment unit is capable of implementing the method as defined in one of claim 12.

Claim 22 (new): The plant of claim 21, wherein said plant includes a natural gas treatment line, downstream of which both a cryogenic unit for production of carbon monoxide (CO) and a unit for production of hydrogen (H₂) are connected;

wherein the treatment line comprises, from upstream to downstream:

- a) a syngas production reactor, in which the natural gas is desulfurized,

- i) a syngas production reactor, in which the natural gas is desulfurized, heavy hydrocarbons are decomposed into methane and carbon dioxide, and the methane is converted into a hydrogen-rich syngas containing carbon monoxide and carbon dioxide;
- ii) an amine-scrubbing decarbonization unit, a carbon dioxide-rich waste stream of which is recompressed at and recycled upstream of the reactor; and
- iii) purification unit for arresting almost all of the water and greatly lowering the carbon dioxide content;

wherein a first outlet of the purification unit is connected to the cryogenic unit, which includes a return line provided with a heater, the line returning to the purification line, and a second outlet of the purification unit is connected to the unit so as to deliver the feed gas for this unit;

wherein the purification unit comprises two adsorbent bottles, placed in line alternately in order to ensure purification by temperature swing adsorption of the gas mixture, leaving the amine-scrubbing unit, the adsorption of water and carbon dioxide taking place when cold, and the desorption of these components taking place when hot; and

wherein the unit comprises six adsorbers, each having an adsorbent material suitable for adsorptively fixing impurities such as hydrocarbons and water contained in the feed gas of the line.